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# Forest Pest Conditions Report for the Northeastern Area - 1985

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# 1985 FOREST PEST CONDITIONS REPORT

for

## THE NORTHEASTERN AREA

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## 1985 INSECT AND DISEASE CONDITIONS IN BRIEF

Defoliators were again the most visible forest pests in 1985. Jack pine budworm populations varied from area to area in the Lake States defoliating approximately 500,000 acres. Spruce budworm populations decreased throughout the Northeastern Area but still defoliated 5.2 million acres. Maine reported the lowest defoliation figures since 1973. Bruce spanworm populations in general are on the decline except in Wisconsin while fall cankerworm defoliation increased areawide. The gypsy moth defoliated 1.7 million acres, an increase of 70 percent over 1984 levels.

Major diseases including beech bark disease, diplodia tip blight, and scleroderris canker were static to slightly decreasing. Oak wilt incidence increased some in the Lake States.

Diebacks and declines caused by a variety of factors continue to cause significant losses. Most of the hardwood losses are associated with previous insect defoliation. Spruce/fir declines in New York and New England affect over 5 million acres. Spruce mortality exceeded 10 percent of standing trees in West Virginia representing 7 percent of the spruce type. There are an estimated 96, 37, and 11 million cubic feet, respectively, of healthy, declining, and dead red spruce in the state.

Tornadoes in Pennsylvania destroyed an estimated \$94 million of timber on 72,750 acres. Five northern counties were most heavily affected by more than 21 twisters spawned on May 31, 1985.

This report was compiled from State reports and survey information from the Northeastern Area State and Private Field Offices in Durham, NH, Morgantown, WV, and St. Paul, MN.

## MAJOR INSECT PESTS

### CONIFER PESTS

#### JACK PINE BUDWORM

Choristoneura pinus

Hosts: Jack pine and red pine

Jack pine budworm populations varied throughout the Lake States. There were decreases in Wisconsin and parts of Michigan and increases occurred in Minnesota and the Upper Peninsula of Michigan (Figure 1).

#### Michigan

Approximately 100,000 acres of moderate to heavy defoliation occurred in the north-central Lower Peninsula. This is a marked decrease from the 600,000 acres of defoliation reported in 1983. Further collapse is expected regionwide even though scattered pockets showed an increase in defoliation.

In the Upper Peninsula, however, populations continue to build as 2,380 acres of heavy defoliation was detected in Schoolcraft County. Visible defoliation was first detected in 1983 and now top kill and tree mortality is occurring on about 1,200 acres in the original infested area. A rapidly building epidemic over the next 2 to 4 years is expected in the Upper Peninsula.

The reduction in areas of heavy defoliation in the Upper Peninsula reflects a refinement in mapping of mixed stands rather than a real decrease in defoliation (7,000 in 1984 vs. 2,380 in 1985).

#### Minnesota

Infestations in central and northeastern Minnesota cover more than a quarter million acres. Over 44,000 acres are infested in Cass, Crow Wing, Hubbard, and Wadena Counties in central Minnesota where over 21,000 acres are moderately or heavily defoliated. In the northeastern part of the state, over 199,000 acres are infested and the intensity of defoliation appears to be increasing. Future trends are uncertain. No losses have been documented.

#### Wisconsin

The infestations in Bayfield and Douglas Counties started out with high early larval populations and then apparently collapsed and no significant defoliation occurred. However, 30,000 acres in adjacent Burnett and Polk Counties suffered heavy to severe defoliation. A smaller area of 7,500 acres in Jackson County (west-central Wisconsin) was moderately defoliated. The future of this infestation is unknown but populations in the Northwestern counties are expected to decline further. No losses were reported in 1985.



## SPRUCE BUDWORM

### Choristoneura fumiferana

Hosts: Balsam fir, white, red and black spruce, hemlock.

The spruce budworm continued its downward trend in the Northeastern Area defoliating a total of 5.2 million acres (Figure 2.). Except for New York, all of the states with infestations reported declining populations and this trend is expected to continue (Table 1.).

### Maine

Populations have declined for the second straight year. The total area infested covers 4.8 million acres in the northern two-thirds of the state with 1.2 million acres of moderate and severe defoliation. The heaviest infestations are in the southeast and west-central portions of the state. Mortality involving greater than 50 percent of the fir in stands larger than 100 acres was found on 300,000 acres. An additional 700,000 acres contained scattered fir mortality (about 10 percent). Further population declines are expected in 1986 with moderate and severe defoliation predicted on 600,000 acres.

In 1985 a total of 415,000 acres were treated with either Thuricide 48LV or Zectran. Results from the Zectran treatments were excellent while results of the Thuricide treatments were erratic. An estimated 35,000 to 70,000 acres will be treated in 1986 using both Bt and chemical insecticides.

### Michigan

Michigan also reported declines in spruce budworm activity as the defoliated area dropped to about 94,000 acres, 12,500 of which were in the light category. Most of the defoliation occurred in Dickenson and Marquette Counties with about 8,000 acres being reported from Menominee County. Further decline of budworm populations is expected over the next few seasons.

Dipel 8L was applied to 1980 acres in 1985. The treated stands were very near harvest and unacceptable tree mortality would have occurred in the absence of treatment. Acceptable foliage protection (30-60 percent live foliage) was achieved with one application at 12 BIUs per acre.

### Minnesota

Decreases in defoliation were also reported where approximately 300,000 acres of light, moderate and heavy defoliation were mapped in Cook, Lake, and St. Louis Counties. Less than 50,000 acres fell in the light category (1 to 20 percent crown defoliation). The outbreak is expected to continue into 1986 but lower populations and less defoliation are expected.

Control activities in 1985 were confined to salvaging through commercial harvests.

### New Hampshire

No visible defoliation was detected in the 1985 aerial survey, a continuation of the downward trend during the last five years. Further population declines are expected in 1986.

### New York

An infestation causing 275 acres of light defoliation was detected in Essex County. No defoliation was reported in 1983 and 1984. This infestation is expected to decline in 1986.

### Vermont

Populations continued to be very low in 1985 with no defoliation detected during aerial surveys for the second consecutive year. Spruce-fir mortality, associated with previous defoliations, dropped from over 46,000 acres in 1984 to less than 12,000 in 1985. Loss estimates for those 12,000 acres totaled 14,430 cords, a significant reduction from the estimated 94,150 cords reported in 1984.

### Wisconsin

The infestation in Price County reported in 1984 has collapsed. A new infestation in nearby Ashland County has resulted in about 15,000 acres of severe defoliation. Future trends are uncertain.

## HARDWOOD PESTS

### BRUCE SPANWORM

#### Operophtera bruceata

Hosts: American beech, oak, sugar maple

Bruce spanworm infestations in the Northeastern Area have dropped significantly in 1985 with the exception of Wisconsin where populations continue to build for the second straight season.

### Maine

Although populations of the spanworm were evident in northern hardwood stands in central and northern Maine, no noticeable defoliation was detected in 1985. This is a significant decrease from the 338,000 and 214,523 acres reported in 1983 and 1984, respectively.

### Michigan

Complete defoliation of hardwoods occurred in small pockets scattered over Iron County in the Upper Peninsula where the spanworm fed in association with the fall cankerworm. Population increases are expected in 1985.

### New Hampshire

Four areas totaling about 470 acres showed understory feeding but no Bruce spanworm caused defoliation was observed during the 1985 aerial survey. Populations are expected to remain low in 1986.

### Pennsylvania

About 3,000 acres were infested in Potter County, a decrease from the 5,000 acres reported in 1984. Further population decreases are expected in the future.

### Vermont

Only light defoliation was detected in Orleans and Washington Counties.

### Wisconsin

Populations increased to 30,000 acres of moderate to heavy defoliation in Florence, Forest, and Menominee Counties. This is a marked increase from the light defoliation reported in 1984. Future trends are uncertain.

## FALL CANKERWORM

### Alsophila pometaria

Hosts: Maple, oak, cherry and other hardwoods.

Fall cankerworm populations continued to build as nearly 100,000 acres of mixed hardwoods, predominantly oak and maple, were defoliated areawide in 1985.

### Michigan

Approximately 8,860 acres were heavily defoliated in scattered areas throughout the Upper Peninsula. The cankerworm occurred in combination with the linden looper and the Bruce spanworm.

### New York

Small infestations of the cankerworm occurred in Genesee County. Many cankerworms were also found feeding with the gypsy moth in western New York.

### Pennsylvania

A total of 65,000 acres of oak and maple were defoliated in Potter and Tioga Counties in 1985, a 30 percent increase over 1984. Decreasing populations are anticipated in 1986.



### Rhode Island

Although no defoliation estimates were made, the fall cankerworm was found statewide in 1985 with heavier concentrations occurring in Kent County. This was the third year of only light populations after a five year period of heavy infestation.

### Wisconsin

Large population increases resulted in pockets of moderate and severe defoliation on 26,000 acres in five counties of south-central Wisconsin. Further increases are expected in 1986.

## GYPSY MOTH

### Lymantria dispar

Hosts: Oaks and other hardwoods

In 1985, defoliation caused by the gypsy moth totaled 1.7 million acres in the Northeastern Area, an increase of 70 percent from that reported in 1984 (Figure 3, Table 2). Particularly noteworthy is the marked increase of defoliation in Michigan, Virginia, and West Virginia, all states with relatively new general infestations.

### Delaware

The generally infested area covers 67,000 acres in southern New Castle and Kent Counties. Within this area, over 5,000 acres of moderate and severe defoliation occurred. Tree mortality is occurring on an estimated 3,000 acres with an associated loss of approximately 15 million board feet. Further spread to the south into Sussex County is anticipated but the future situation is uncertain.

Direct control efforts included the application of Bt at 20 BIU per acre on 67,000 acres. Generally, good foliage protection was achieved.

### Iowa

Six male moths were caught in pheromone baited traps in 1985. Only one was from an area where a moth had been trapped previously.

### Illinois

Only 37 male moths were trapped in 1985, a significant decrease from the 255 caught in 1984. No larvae have been found.

### Indiana

There are potential infestations in Elkhart and Kosciusko Counties on an estimated 20 and 40 acres, respectively. Trapping results totaled 91 moths from 21 counties. The number of moths captured is about the

same as in 1984. Eradication efforts in Allen, Bartholomew, and Marion Counties are continuing with success expected in 1986 for Bartholomew and Marion Counties. It is anticipated that the Allen County eradication should be accomplished within three years.

Control efforts have centered on mass trapping for the past two years. Mass trapping will be continued in 1986 with the possibility of releasing sterile F-1 eggs in one location.

#### Maine

The area of infestation in Maine covers 10,249 acres in Hancock and Penobscot Counties. Within that area, almost 7,000 acres suffered moderate to heavy defoliation. Areas heavily defoliated in prior years in the southern half of Maine had no noticeable defoliation. Populations are considered stable at endemic levels presently. However, further expansion is anticipated in the northern areas of the infestation.

Preliminary data analysis, based on cumulative years of defoliation, indicates losses of about 15 percent of the oak basal area in stands heavily defoliated for two or more years. No control projects have been conducted nor are they contemplated.

#### Maryland

Maryland reports 83,488 acres of moderate to heavy defoliation, double that reported in 1984. Increases in activity are anticipated in 1986 with damaging populations in the west and upper eastern shore for the second year in a row. Loss estimates total 28,000 cords of pulpwood and 28.3 million board feet of sawtimber.

Control efforts involved the aerial application of Dimilin, Bt, and Sevin on 112,957 acres. Less than 5.5 percent of the treated area experienced moderate to heavy defoliation.

#### Massachusetts

Moderate to heavy defoliation totaled 414,084 acres and an additional 63,721 acres were lightly defoliated in areas of central and southeastern Massachusetts and Cape Cod. This is more than double the defoliation reported in 1984 and further increases are expected, particularly in the southeastern part of the state and on Cape Cod.

Control efforts involved the aerial application of Bt over 11 towns totaling 23,809 acres and on an additional 4,797 acres of state property.



### Michigan

Michigan reports a nearly three-fold increase in defoliation with 18,460 acres in Isabella and Midland Counties. The gypsy moth is now firmly established in the state and further expansion is expected. Defoliation is anticipated in Clare County as well as Isabella and Midland in 1986.

No detectable mortality has occurred yet and no control projects were conducted in 1985.

### Minnesota

Statewide trapping resulted in the capture of 126 male moths at 91 sites, most from the Minneapolis/St. Paul Metropolitan Counties. This is a decrease from 1984.

Eradication efforts involved the use of Thuricide 48LV on 195 acres at 4 different sites. The site at White Bear Lake was considered successfully eradicated and efforts will continue in 1986 at the two sites in Golden Valley and the one at Lakeville.

### Missouri

Missouri's continuing trapping program resulted in the capture of 19 male moths statewide in 1985 compared to 13 in 1984. Seventeen of the nineteen moths were caught in the St. Louis Metropolitan Area.

### New Hampshire

Aerial surveys conducted in mid-July 1985 revealed no noticeable defoliation in New Hampshire. A total of 3,300,000 acres were flown. Ground observations suggest low populations are distributed throughout the state where host type exists. A slight increase is anticipated in 1986.

Twig dieback involving from 10 to 70 percent of the crown is beginning to occur in some oak stands south of the White Mountain National Forest. No direct control has been attempted.

### New Jersey

The Department of Agriculture and the Division of Parks and Forestry report an infested area of 555,035 acres statewide with nearly half, 251,852 acres, being moderately to severely defoliated. This is an increase of 75 percent after three years of decline; further increases are anticipated, particularly in the northern counties.

A total of 46,518 acres of state and municipal lands were treated with Bt at 16 BIUs per acre in 96 ounces of formulation.

### New York

Moderate to heavy defoliation totaled 129,820 acres in 1985, nearly a four-fold increase from 1984, and further increases are anticipated in 1986.

Oak decline with some associated mortality has followed gypsy moth defoliation wherever it occurs in New York. Mortality rates are variable but have gone as high as 90 percent in stands in Orange, Sullivan, and Ulster Counties.

Control efforts in western New York involved the spraying of about 12,500 acres in Cattaraugus County.

### Pennsylvania

Increasing gypsy moth populations caused 581,113 acres of moderate and heavy defoliation over a 20-county area of central Pennsylvania. This is an increase from the 450,000 acres reported in 1984 and further increases are expected in 1986.

The cumulative loss figures reported in 1984 of 218 million ft<sup>3</sup> of pulpwood and 951 million board feet of sawtimber are in the process of being updated but the latest totals are not yet available.

Control projects in 1985 consisted of aerial application of Bt on 84,757 acres, Dimilin on 87,889 acres, and Alsystin on 4,888 acres; results were excellent.

### Rhode Island

Essentially, all of the state is infested (367,710 acres) with the exception of Bristol and Newport Counties. Within that area, 133,920 acres of moderate and heavy defoliation occurred. Populations started increasing in 1984 after the decline in 1983 which followed two years of record defoliation. Egg mass surveys reveal heavy infestations in virtually all forested areas. Loss estimates are unavailable but oak decline and tree mortality are evident statewide.

Gypsy moth control was conducted on 22,000 acres using Bt at 12 BIUs per acre. Results were considered poor throughout the treated area.

### Vermont

Gypsy moth populations remained at low levels. Larval counts were high early in the spring; dropping off dramatically later in the season. No defoliation was detected in 1985 and no additional mortality has been detected on plots being monitored since 1982.

### West Virginia

Defoliation in 1985 totaled approximately 2,470 acres, most of which occurred in Berkeley County. Presently all life stages can be found in 8 of the northeastern counties. The infestation continues to move southward and westward. Mortality estimates are not yet available but mortality could approach 40 percent in some stands.

Approximately 54,000 acres were treated with Dimilin in 1985. Based on egg mass survey results conducted in late summer, the project was exceedingly successful, approaching 90 percent control. In 1986 it is anticipated that about 60,000 acres will be treated to slow gypsy moth spread and protect foliage.

### Wisconsin

Eradication attempts appear to have been successful in the Oconomowoc and Monona infestations, as trap catches in these areas were reduced to zero this year. Infestations in Appleton, Elm Grove, and Delavan have been eradicated in previous years. Statewide trapping results for 1985 totaled only 13 male moths from 10 locations, a marked decrease from the 79 moths trapped at 23 locations in 1984.

## M A J O R   D I S E A S E S

### BEECH BARK DISEASE

Nectria coccinea var. faginata and Cryptococcus fagisuga

Hosts: American beech

The distribution of this disease remains essentially the same as it was in 1984 (Figure 4). Beech mortality continues across New England, New York, Pennsylvania, and West Virginia. Scale populations also occur in five northeastern counties of Ohio and Highland County in Virginia.

### New York

Infections occur throughout the state with tree mortality in the eastern two-thirds of the state. Levels have been increasing in the past and are expected to continue to increase until all trees in the westernmost counties have been exposed.

Large volumes of beech in the Adirondack and Catskill Forest Preserves have been killed. No timber harvesting is permitted in the preserves.

### Pennsylvania

Infections continue to increase but the rate of spread of the beech scale is decreasing since most areas with heavy beech concentrations are now infested. The "killing front" is now active on the Allegheny National Forest.



## Vermont

Populations are increasing on monitored plots in the western part of the region.

## DIPLODIA TIP BLIGHT

### Sphaeropsis sapinea

Hosts: Austrian, jack, red, and Scotch pines

This disease has widespread distribution and is a perennial problem, particularly on Austrian pine. However, incidence and damage have been somewhat lower the past two years.

## Indiana

This disease is primarily a problem in windbreaks, the urban environment, and in Christmas tree plantations. Heavy damage to Austrian pine windbreaks in Newton County was reported. Damage in 1985 was less than in the previous two years.

## Minnesota

A total of 200 acres of jack pine in Roseau County is infected. This area is characterized by droughty soils and stressed trees. Tree mortality is about 10 percent, moderate to heavy branch mortality and top kill is about 60 percent, and 30 percent of the trees have light branch mortality.

## Missouri

Austrian pines, and to a lesser extent Scotch pines, suffer shoot and branch dieback from this disease which is widespread in the state.

## Rhode Island

Diplodia tip blight is found statewide with low to moderate severity estimated in all counties.

## Wisconsin

About 5,000 acres of red and jack pine in Douglas County are affected. A two-plantation survey revealed an 8 percent infection rate with 1 percent mortality. No major spread is expected.

## OAK WILT

### Ceratocystis fagacearum

Hosts: Oaks

Infections are widespread across the midwest (Figure 5) with low to moderate rates and some tree mortality occurring each year. The Lake States are experiencing increased activity which is expected to continue.

### Indiana

A total of 75 acres in Benton, Blackford and Jay Counties have scattered (although unconfirmed) infections. Oak wilt is a continuing problem causing a small amount of mortality annually.

### Iowa

The severity of infection is moderate statewide and has remained at that same level for the past several years. Losses have not been estimated but it is felt that intensive harvesting and management programs have kept losses within acceptable limits.

### Michigan

Over 1000 acres, involving many epicenters, are infected in the northern Lower and Upper Peninsula of Michigan. Losses are difficult to assess because many of the epicenters occur on private land but approximately 3,500 trees in about 80 epicenters have been lost in the Upper Peninsula.

Suppression activities include creating root graft barriers with vibratory plows and informing the public of the dangers in moving infected firewood and/or wounding oaks in May and June.

### Minnesota

The area of infection has not been documented but is confined primarily to the Southeast Region and the Minneapolis/St. Paul Metro Area. Approximately 5 percent of the red oak in the Metro Area has been lost and oak wilt is expected to continue to be a serious problem. Chemicals and/or vibratory plows have been used to disrupt root grafts and prevent the spread of the fungus.

### Missouri

Scattered forest and ornamental trees including pin, shingle, northern red, and black oak were infected statewide in 1985. Scattered trees die of this disease but no large scale mortality is expected.

### Pennsylvania

Oak wilt infections have been reported from most of the counties in the southwestern one-third of the state. Recent severity seems to be decreasing and conditions are expected to remain static.

### Vermont

No suspected infection centers were detected during aerial surveys in 1985.

## Wisconsin

Marinette County in northeastern Wisconsin and Brown County (Green Bay area) in eastern Wisconsin are new county records reported in 1985. Oak wilt has now been observed in 51 counties in Wisconsin and the incidence of this disease is increasing along the northeastern border of its range. Trenching, sanitation, and limited logging entry periods are approaches to control.

## SCLERODERRIS CANKER

### Gremmeniella abietina

Hosts: Jack, red and Scotch pines

The incidence of this disease seems to be static to slightly declining areawide (Figure 6) with the exception of portions of northern Vermont where some spread was detected.

## Maine

Maine's situation remains stable at infection sites which were detected several years ago; no new sites have been found since. Control activities involving sanitation should minimize the prospects for spread.

## Michigan

Frost pockets with some mortality of 1 to 3 foot jack pine has been reported from Luce and Schoolcraft Counties.

## New York

Although the total area of infections is unknown, 1,500 acres of moderate infections and 500 acres of severe infections have been reported from Lewis County. Tree mortality is occurring in all counties infected with the disease except Saratoga County. Infection levels have declined since 1984, future trends are uncertain. A quarantine, enforced by the Department of Agriculture and Markets, remains in effect.

## Vermont

Scleroderris canker was not observed during a survey of four counties in the southern portions of the state. All known red and Scotch pine plantations in at least five towns in each county were inspected, if they were at least two acres in size and were planted between 1960 and 1969. No symptomatic trees were found.

In the northern half of the state, infections were found in eight previously uninfected towns during a survey of 130 plantations in 19 towns bordering the quarantine zone. Infection rates have been



increasing during the past two years, probably due to wet spring weather. The total number of plantations known to be infected is now 122 statewide. This includes 104 red pine and 18 Scotch pine plantations totaling 820 and 150 acres, respectively.

#### Wisconsin

Scleroderris canker has now been reported from 11 counties in the northern one-third of the state. One new location was found in Bayfield County in 1985. Infection levels throughout the 11 counties were generally light. The situation has remained essentially static for the last two seasons.

### DIEBACKS AND MORTALITY CAUSED BY COMBINED FACTORS

#### ASH

##### Indiana and Iowa

Ash decline is occurring statewide in Indiana where it is epidemic in the northern one-third of the state. Although no mortality surveys have been conducted, it is estimated that annual mortality is less than one tree per acre. The current level of decline is expected to continue in 1986.

In Iowa, the problem (which was first noticed 3 years ago) seems to be increasing in intensity and further increases are expected in the future. Seven counties currently contain infections.

##### New York and Vermont

In New York, 218,200 acres of moderate to heavy mortality have been detected in Clinton, Jefferson and St. Lawrence Counties. Other areas where the decline occurs have not been surveyed, so information is not complete enough to provide a statewide picture of ash dieback intensity. Symptoms of ash yellows is common and it is believed that this disease is the primary cause of the dieback.

In Vermont, dieback is present throughout the state and appears to be increasing in some areas, particularly at the higher elevations.

#### BIRCH

##### Michigan and Wisconsin

In Michigan, decline of yellow birch is most severe on low wet sites in Baraga and eastern Iron Counties. The drought of 1983 is thought to be a contributing factor.

In Wisconsin, nearly 31,000 acres are affected in Florence and Forest Counties where twig and branch dieback, leaf wilting and defoliation has occurred on yellow birch. Up to 60 percent of a tree crown may be affected. The condition is associated with heavy production of catkins and strobiles, frost, and defoliation by a snout beetle. Future trends are unknown. Presalvage cutting is planned for some areas that have been severely affected.

#### New York and Vermont

Yellow birch decline has been increasing in Lewis and Herkimer Counties in New York. Severity, impacts, and future trends are presently unknown.

Vermont reports that birch decline was more noticeable than usual in some locations in 1985, particularly in the Camel's Hump area.

### LARCH

#### New York and Vermont

Larch decline is widespread in the northeastern counties of New York but the severity and impacts have not been determined. Incidence has been increasing. Tamarack has been dying for the past five years and some areas now have severe mortality. Future trends are unknown.

In Vermont, larch decline continues to some extent. Over 500 acres of mostly high mortality was mapped in the Northeast Kingdom during the 1985 aerial survey. Increases were noted in Bennington County in the south and additional mortality was noted in Whitingham.

### MAPLE

#### New York

The extent of sugar maple decline is unknown but occurs mostly in northern New York and the Capitol district area. This is a long-term problem and there is some evidence that links the decline to heavy sugar tapping and cattle being grazed on wet sites.

Red maple decline affecting 130,000 acres in Herkimer and Lewis Counties has caused severe crown thinning and some mortality. Injury ranged from moderate on 100,000 acres to heavy on 30,000 acres. Future trends are unknown.

#### Pennsylvania

Moderate sugar maple decline (40-60 percent mortality) in northern Pennsylvania totaled 1,612 acres and heavy decline (60 percent or greater) totaled 1,744 acres. This is an increase from past levels



and further increases are anticipated. The decline is related to past insect defoliations on sites that may be marginal for sugar maple growth.

#### Vermont

Maple decline increased this year, particularly in the northern counties. Aerial surveys revealed 5,259 acres of hardwood decline, much of that maple, which was unrelated to defoliation by the forest tent caterpillar. An additional 3,192 acres of decline was detected in areas that have been previously defoliated.

### OAK

#### Iowa and Missouri

Oak decline is a statewide problem in both of these states and is believed to be associated with drought and secondary agents such as root rots and boring insects. Levels seem to be lower than in 1984.

#### Maryland

Oak decline is statewide with some mortality and dieback of scattered trees. The decline seems to be related to various stress factors.

#### New York

Oak decline has followed gypsy moth defoliation wherever it has occurred. Heavy defoliation is often followed by root rot disease and wood borers. The acreage affected is unknown but several counties in southeast and south-central New York are affected.

Loss estimates have not been made but mortality can be very high. Forest stands in Orange, Sullivan, and Ulster Counties have had mortality levels in excess of 90 percent. Future trends are unknown.

### SPRUCE AND FIR

#### Maine, New York, New Hampshire, Vermont, and West Virginia

Red spruce decline has affected 5.1 million acres in northern New York causing moderate to heavy mortality on 326,100 acres of spruce-fir type. Losses are estimated at nearly 75 million cubic feet of spruce. There appears to be a slight decrease in decline from 1984 and it is anticipated that the decline trend will stabilize and/or decrease further.

In northeastern Vermont, red spruce decline remains common on high elevation sites and in certain drained lower elevation stands. Aerial surveys revealed 1,453 acres of spruce decline at upper elevations in 1985. Moderate mortality was found on 1377 acres in Essex, Franklin, Lamoille, and Orleans Counties.

Permanent spruce decline monitoring plots were established by the USDA Forest Service in cooperation with the states of New York, New Hampshire, Vermont, and West Virginia.

In Maine, the fir problem first reported in 1984 seems to remain constant in 1985 with little noticeable increase in frequency even though some new trees were evident. This condition has been reported as "Stillwell's Syndrome" in Canada.

There are approximately 110,685 acres of forest with red spruce in West Virginia. About 7 percent or 8,000 acres have mortality exceeding 10 percent of standing trees. About 35 percent of red spruce basal area, 40 percent of the number of trees, and 33 percent of the volume in the state is either dead or declining. Infection by Valsa kunzei (= Cytospora kunzei) was the primary reason for crowns of the larger size classes being classified as declining.

## HARDWOODS

### New Hampshire

A decline of mixed hardwoods including beech, birches, maples, and oaks covers 2.5 million acres throughout the hardwood types of the state. Light twig dieback is common. However, 60 percent of the plots measured had crown dieback greater than 10 percent affecting from 10 to 55 percent of the stands. No loss estimates have been determined yet but the most severely affected tree species appear to be red oak, sugar maple, and white and yellow birch.

Many, but not all, affected areas coincide with known past defoliations by such insects as the Bruce spanworm, gypsy moth, and saddled prominent caterpillar. Further evaluation is necessary before trends can be determined.

# OTHER INSECT AND DISEASE PESTS

INSECT	HOST	LOCATION AND REMARKS
Balsam twig aphid <u>Mindarus abietinus</u>	Balsam fir	ME - Populations increased again in 1985 in Christmas tree plantations - more control required.  VT - Marked population increases from 1984 - moderate to heavy damage in some Christmas tree plantations. Populations are expected to peak in 1986.
Basswood thrips <u>Sericothrips tiliae</u>	Basswood	MN - Defoliation varied from light to moderate (less than 50 percent) on one-half million acres having a basswood component. Some mortality of understory trees occurred in scattered locations. Continued activity is likely at low levels.  WI - Light to severe defoliation occurred on an undetermined number of acres in several northeastern, northwestern, and southwestern counties. Populations are decreasing in the northwestern counties and increasing elsewhere. Future trends are uncertain.
Birch Casebearer <u>Coleophora serratella</u>	Birch	ME - Areas of heavy defoliation in 1983 show a four-fold increase in top dieback and in dead or dying trees. In 1985, 37,000 acres were heavily defoliated in southeastern Washington County.
Eastern Tent Caterpillar <u>Malacosoma americanum</u>	Cherry and other hardwoods	ME - Populations up strikingly from 1984. MD - Very low populations in 1985.  RI - Minor populations found statewide - down for the second consecutive year.
Fall Webworm <u>Hyphantria cunea</u>	Hardwoods	Populations of this insect found areawide. Reports from IN, ME, MD, indicate widespread scattered light defoliation.  RI - Minor populations statewide for the second year - moderate to heavy defoliation.  VT - Scattered areas of heavy defoliation and widespread light defoliation.



INSECT	HOST	LOCATION AND REMARKS
Forest Tent Caterpillar <u>Malacosoma disstria</u>	Hardwoods	IL - Moderate to severe defoliation on 2,200 A in Jackson County - populations appear to be building.  MN - Reports 15,500 A of defoliation in the northeastern part of state; 12,000 A were moderate to heavy. This is the ninth year of defoliation in that area.  ME, MI, NY, PA, VT have collapsing or low populations. ME and NY report mortality is occurring from earlier defoliations.
Larch beetle <u>Dendroctonus simplex</u>	Tamarack	ME - Populations are scattered statewide causing tree mortality from 20 to 100 percent of affected stands. Infestations are increasing and showing no signs of stabilizing.
Large Aspen Tortrix <u>Choristoneura conflictana</u>	Aspen	MN - Almost 150,000 A were defoliated in Cook County in northeastern Minnesota, a considerable increase over 1984.
Locust leafminer <u>Odontota dorsalis</u>	Black locust	IN and WV report widespread populations that are static or declining.  VT - Widespread scattered defoliation with areas of localized heavy feeding.
Maple leafcutter <u>Paraclemensia acerifoliella</u>	Sugar Maple	NY - Almost 47,000 A of defoliation, about 20,000 A is moderate to severe. Impact on the sugar bush may be underestimated.  VT - Low populations are causing light defoliation in some stands.
Oak leaf-tier <u>Croesia semipurpurana</u>	Oaks	MA - Over 350,000 A defoliated in southeastern and north-central Massachusetts. Populations are building, up to 30 percent mortality is occurring in Franklin County.  ME Light defoliation in 1985 but appears to be building.

INSECT	HOST	LOCATION AND REMARKS
Oak skeletonizer <u>Bucculatrix ainliella</u>	Oaks	High or building populations across New England.  MA - An estimated 3 million acres affected statewide and building.  NH - Over 100,000 A of moderate to heavy defoliation in southern part of state.  NY - Moderate defoliation on 100 A - appears to be building.  RI and VT widespread populations.
Orangehumped mapleworm <u>Symmerista leucitys</u>	Maple	MI - 6,700 A of moderate and heavy defoliation - a collapse is expected.  VT - Occasional colonies noted.
Orangestriped oakworm <u>Anisota senatoria</u>	Oak	PA - Light defoliation on over 20,000 A, an increase from 1984.  RI - Populations are increasing, 4000 A of moderate to severe defoliation occurred in 1985.
Oystershell scale <u>Lepidosaphes ulmi</u>	Beech	ME - Widespread across the southern half of the state, 500 A of severe damage.  VT - Moderate to high populations on beech understory in four counties.
Pear thrips <u>Taeniothrips inconsequens</u>	Maple	NY - Populations are nearly statewide with vast acreages affected.  PA - 110,000 A of moderate to heavy defoliation - a marked increase from 1984.  VT - Widespread foliage damage.
Periodical cicada <u>Magicalicada septendecim</u>	Hardwoods	MD - Heavy flagging and browning of hardwoods statewide.  PA - 640,000 A of moderate to high populations.

INSECT	HOST	LOCATION AND REMARKS
Red-humped oakworm <u>Symmerista canicosta</u>	Oak	MI - Moderate to heavy defoliation (>50 %) on 15,460 A. Populations are increasing.  PA - 1,000 A of light defoliation. This pest was not reported in 1984.
Red pine adelgid <u>Pineus boernerii</u>	Red pine	NY - Reported from Putnam County - populations are increasing and further increases are expected.
Red pine scale <u>Matsucoccus resinosae</u>	Red pine	NY - 400,000 A are infested in southeastern New York. Populations are increasing and spreading northward at almost 2 miles per year. Some branch dieback and tree mortality is occurring.
Saddled prominent <u>Heterocampa guttivitta</u>	Beech & Maple	ME - No noticeable defoliation but moth numbers are up.  MI - Almost 5,000 A defoliated in the northwestern Lower Peninsula and in the Upper Peninsula. Increases are expected.  VT - Low populations reported.
Saratoga spittlebug <u>Aphrophora saratogensis</u>	Red pine	ME - No reports of damage in 1985.  MI - Populations have decreased over the last 4 years but the state continues its strict monitoring and control program to minimize losses.  WI - Infestations reported in Iron, Oneida, Sawyer, and Vilas Counties. Populations are down.
CONIFER SAWFLIES		
A pine sawfly <u>Neodiprion pratti</u>	Pine	MD - Almost 87,000 A of loblolly pine with moderate to heavy defoliation - no mortality reported.
European pine sawfly <u>Neodiprion sertifer</u>	Pines	IL, IA, MI, NY, VT - Varying levels of infestation reported, generally low and scattered. This pest is often associated with Christmas tree plantings.



INSECT	HOST	LOCATION AND REMARKS
Larch sawfly <u>Pristiphora erichsonii</u>	Larch	ME - Low populations reported.  PA - Decreasing populations reported.
Red headed pine sawfly <u>Neodiprion lecontei</u>	Pines	MI, NY, VT, WI - fluctuating populations, generally low, are causing scattered pockets of defoliation, some moderate to severe in Wisconsin. Increases may occur in Michigan and Wisconsin.
Spruce coneworms <u>Dioryctria reniculelloides</u> (ME) <u>Dioryctria abietivorella</u> (MN)	Spruces	ME - 4.8 million A infested, generally associated with spruce budworm - about 200,000 A of light to moderate defoliation. Populations have been declining.  MN - A seed orchard at Cotton, MN lost about 13 percent of the cones to this insect and an additional 26 percent to the spruce budworm.
Spruce gall midge <u>Mayetiola piceae</u>	Spruces	VT - Heavy damage to ornamental spruce - this is the first report of this pest in Vermont.
White Pine weevil <u>Pissodes strobi</u>	Pines & Spruces	ME - Established 48 monitoring plots in 1984 and 1985.  MI - 6,000 A impacted in the northwestern Lower Peninsula, a slight increase over 1984 levels. Further increases are expected.  NY - Found statewide and increasing in southeastern part of state.  RI - Distributed statewide with moderate levels in all areas. Populations are down for the second year.  VT - Populations and damage are increasing statewide.

DISEASE	HOST	LOCATION AND REMARKS
Annosus root rot <u>Heterobasidium annosum</u>	Red Pine	ME - Four new sites totaling 30 acres found in 1985. Incidence is increasing and is expected to continue.  VT - Infection center reported from the towns of Chelsea and Chester.
Ash leaf rust <u>Puccinia sparganioides</u>	Ashes	ME - An estimated 3000 A infected, a decrease from the 5000 A reported in 1984. This is the first decline in activity for 3 years. Further decreases are expected.
Cytospora canker <u>Cytospora leucostoma</u>	Black cherry	MD - Range has expanded. Some upper crown mortality occurring.  PA - Several counties in western Pennsylvania affected as the area increases.  WV - Found in eight counties, this is the first report of this disease in West Virginia.
Dogwood anthracnose <u>Discula</u> sp.		MD - About 33 percent (135 stems/acres) of all dogwoods at Catocin Mountain Park have been killed. Only 3 percent of the dogwood stems were completely free of symptoms.  WV - An infection was confirmed in Preston County and other suspect infections were found in Kanawha and Greenbrier Counties.
Dutch elm disease <u>Ceratocystis ulmi</u>	Elm	ME - Only isolated trees, or trees intensively managed, remain uninfected - heavy mortality on residual trees.  MO - Widespread in the state, both forest and ornamental elms are being lost. Very few elms remain in Missouri's forests.  WV - Incidence in 1985 was high throughout the state. An important forest and shade tree problem.
Elm phloem necrosis	Elm	IN - A 20 A stand in Marion Co. suffered 75% mortality, sapling and pole sized trees.  WV - Symptomatic trees found near Charleston, not confirmed.



DISEASE	HOST	LOCATION AND REMARKS
European larch canker <u>Lachnellula wilkommii</u>	Larch	ME - A total of 6,500 A of larch are infected with both stem and branch cankers. A slowly increasing trend is expected. State and Federal quarantines are being implemented.
Fir-Fern rust <u>Uredinopsis mirabilis</u>	Balsam fir	ME - Incidence and intensity is lower in 1985 but this disease is still present in Christmas tree plantations.  VT - Widespread light to moderate defoliation of Christmas trees - down considerably from the levels reported in 1983 and 1984.
Needlecasts:		
<u>Cyclaneusma minus</u>	Scotch pine	WI - 1,700 A of Christmas trees affected. Infection rates range from 72% in three year-old trees to nearly 100 percent in trees 5 and 6 years old. A decrease is expected in 1986 after two years of increases.
<u>Lophodermium pinastri</u>	Scotch pine	VT - Widespread light damage to Christmas trees.  WV - Incidence has been generally low. One case of infected planting stock from a nursery was reported.
<u>Neamacyclus minor</u>	Scotch pine	ME - Spot infestations in two locations.  VT - Light infection of Christmas trees in Barre and Springfield Counties.  WV - Incidence was very low in 1985.
<u>Rhabdocline pseudotsugae</u>	Douglas Fir	ME - This disease is increasing in intensity and incidence.  VT - Light to moderate damage in Essex and Wolcott Counties.
<u>Rhizosphaera kalkhoffii</u>	Spruce	ME - This disease is generally distributed throughout the southern half of the state. Incidence may be increasing.  WV - Several reports of infection in 1985.

DISEASE	HOST	LOCATION AND REMARKS
Red Pine malady - decline and mortality	Red pine	<p>NY - Over 20,600 acres of dead and dying red pine reported in south-central New York. The trend has been that of increases and it is expected to continue. The exact cause is unknown.</p> <p>WI - Ten locations have been detected in southern and central Wisconsin. Individual pockets expand sporadically in stands of red pine 30-40 years old. Efforts are continuing to determine the cause.</p>
Shoestring root rot <u>Armillariella mellea</u>	Conifers	<p>ME - Distributed throughout the state where type conversion to conifers has occurred - this disease is causing losses in Christmas tree plantations. It has been increasing and further increases are anticipated.</p> <p>MI - Scattered single tree mortality on the Baraga Plains.</p> <p>VT - This disease is associated with the spruce decline statewide.</p>
Weather related damage	Mixed pines & hardwoods	<p>MN - Straight line winds damaged timber on 2,000 acres totaling 25,000 cords. Aspen (70 percent) and jack pine (20 percent) were the primary species affected.</p> <p>PA - Tornadoes (21) destroyed all the timber on 72,750 A in 1985. Losses are estimated at \$94 million.</p> <p>The Counties of Forest, Crawford, Erie, Venango, and Warren, were affected. Excessive twisting and breakage rendered much of the material unusable. It is anticipated that about 50 percent will be salvaged.</p>
White pine blister rust <u>Cronartium ribicola</u>	White pine	<p>ME - Over 1.8 million A in the Ribes eradication control area. Losses are negligible due to the success of the control program.</p>

DISEASE	HOST	LOCATION AND REMARKS
		<p>NY - The disease occurs statewide and, based on the number of inquiries, it appears to be increasing.</p> <p>VT - Distribution is statewide and incidence of the disease is increasing.</p> <p>WV - Over 400,00 acres now fall within the Ribes control area. In 1985 suppression work was conducted on 3,207 acres.</p>
White pine root decline <u>Verticicladiella procera</u>	White pine	<p>IN - This disease occurs statewide where light infections cause scattered single tree losses in windbreaks and Christmas tree plantations.</p> <p>WV - Pine root decline continues to be a problem in white pine plantations. Annual losses are reported to be about 59 percent.</p>

Figure 1. -- Jack pine budworm defoliation in the Lake States - 1985.





Figure 2. -- Spruce budworm defoliation in the Northeast - 1985.



Figure 3. -- Gypsy moth defoliation in the Northeast - 1985.

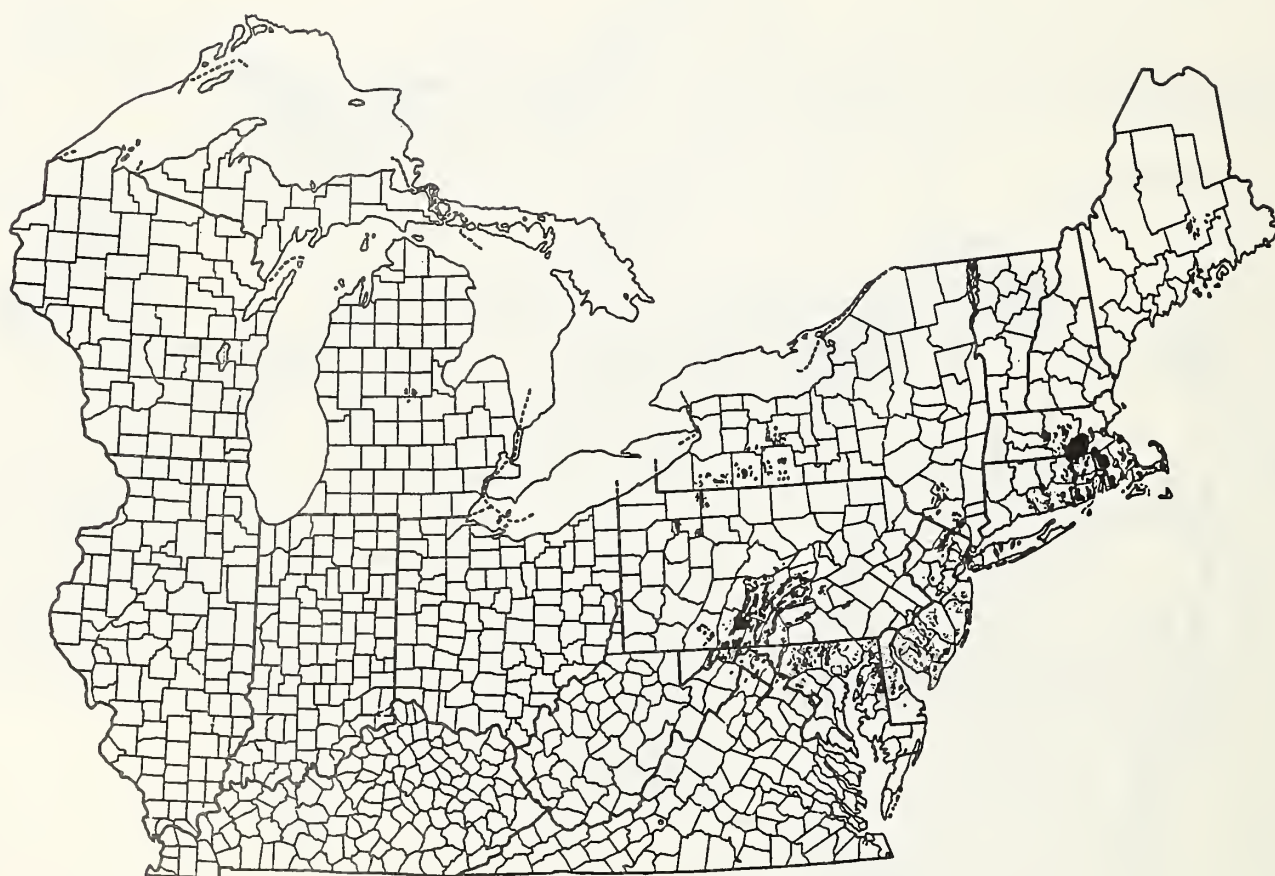


Figure 4. -- Distribution of beech bark disease - 1985.

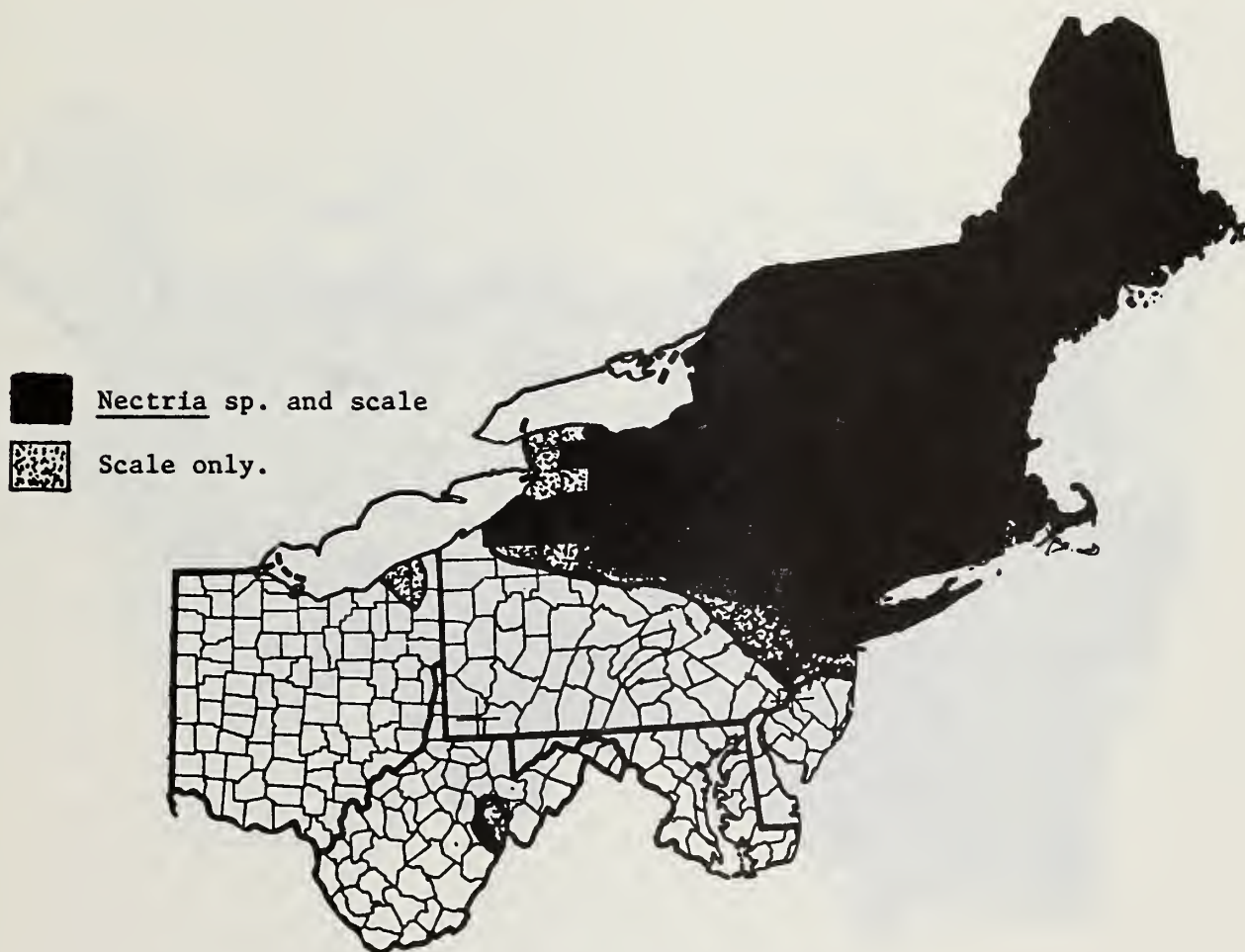


Figure 5. -- Distribution of oak wilt - 1985.





Figure 6. -- Distribution of scleroderris canker - 1985.

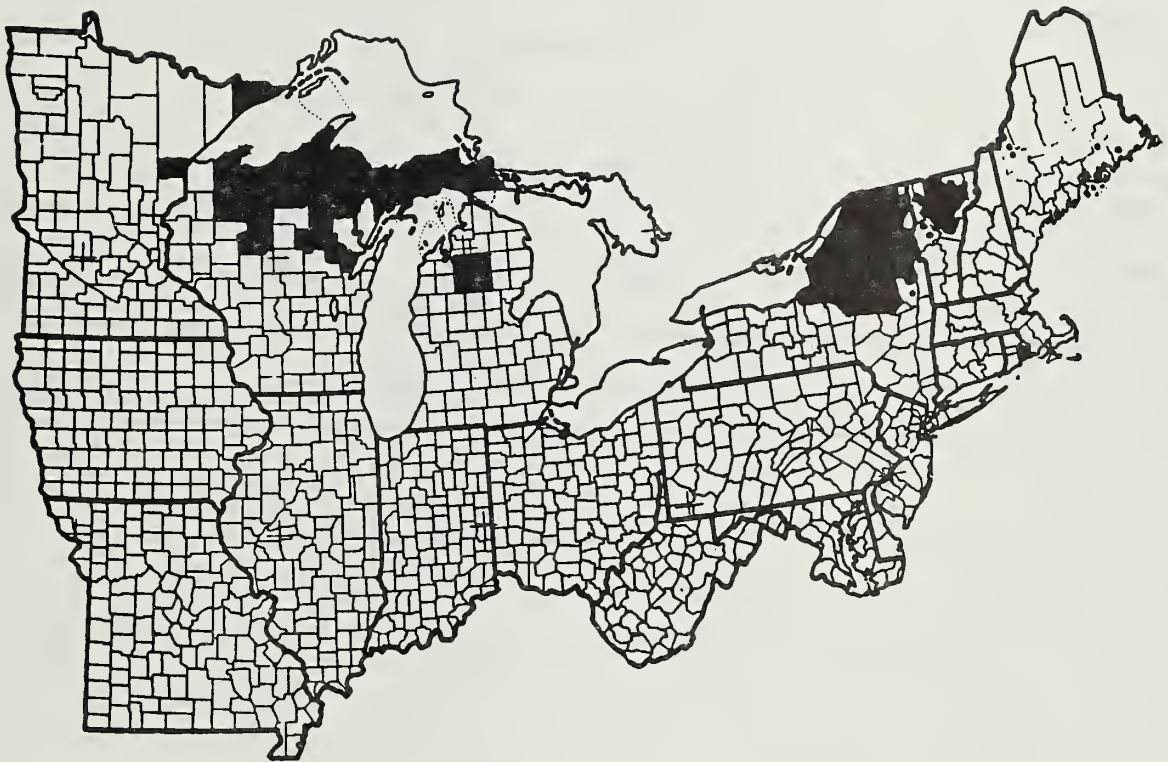


Table 1. -- Acres of spruce budworm defoliation in the Northeast - 1983-1985.

State	Acres Defoliated		
	1983	1984	1985
Maine	6,000,000	5,500,000	4,800,000
Michigan	145,952	192,394	93,810
Minnesota	138,700	361,600	307,273
New Hampshire	5,800	930	0
New York	0	0	275
Vermont	178,000	0	0
Wisconsin	20,000	22,050	15,000
Total	6,488,452	6,076,974	5,216,358

Table 2. -- Acres of gypsy moth defoliation in the Northeast - 1983-1985.

State	Acres Defoliated		
	1983	1984	1985
Connecticut	153,239	544	89,544
Delaware	2,992	14,203	5,144
Maine	16,285	1,892	6,698
Maryland	15,870	41,824	83,488
Massachusetts	148,133	185,520	414,084
Michigan	457	6,425	18,460
New Hampshire	560	0	0
New Jersey	340,285	98,695	239,350
New York	290,843	33,678	129,820
Pennsylvania	1,360,824	450,642	581,113
Rhode Island	53,880	164,600	133,920
Vermont	0	0	0
Virginia	0	374	5,200
West Virginia	0	0	2,470
Total	2,383,368	998,397	1,709,291





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